Defense Information Systems Agency

A Combat Support Agency

Enterprise Voice Services

Component of DoD Unified Capabilities

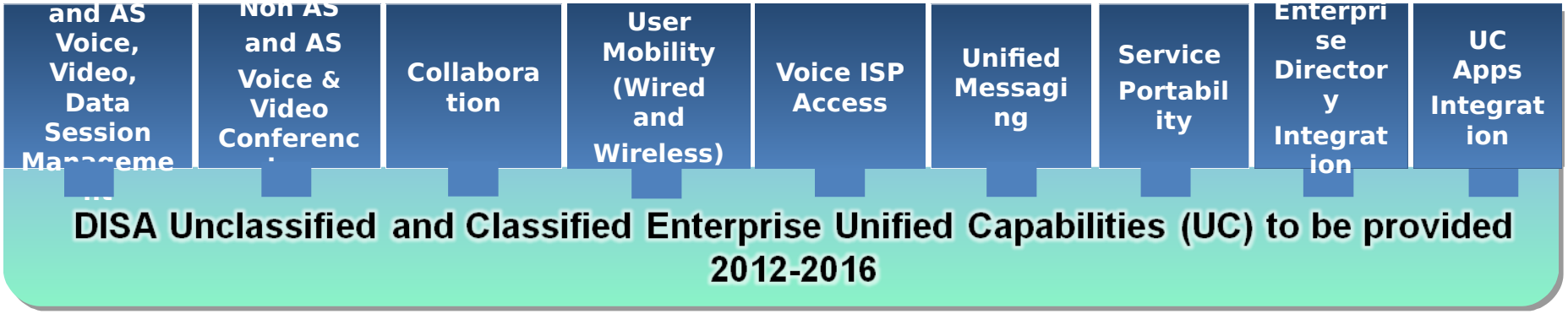
DISA/NSE

Unified Capabilities (UC) Enterprise Objectives

Centralized Voice, Video, and Data Services

A Combat Support Agency

- **Enterprise Service Objective:** Provide the full range of Unified Capabilities from a limited number of regional locations:
  - **Centrally located Voice and Video over IP (VVoIP) Controllers & XMPP Servers**
  - **Minimal footprint at DISA sites worldwide to lower total cost of ownership**
  - **Supports enterprise VVoIP conferencing & XMPP Federation**
  - **Leverages robust DISN transport**
  - **Facilitates Service Mobility for DISA users deployed globally**
  - **Enables closer integration with DISA enterprise collaboration / directory services**


and AS Voice, Video, Data Session Manageme
Non AS and AS Voice & Video Conferenc
Collabora tion
User Mobility (Wired and Wireless)
Voice ISP Access
Unified Messagi ng
Service Portabil ity
Enterpri se Director y Integrat ion
UC Apps Integrat ion
DISA Unclassified and Classified Enterprise Unified Capabilities (UC) to be provided 2012-2016

Enterprise UC Implementation Schedule

DISA
A Combat Support Agency

Extracted from UC Master Plan

Implementation	FY11	FY12	FY13-14	FY15-16
Planning	Complete Requirements For Enterprise UC	Complete BCA and UC IP		
	Program/Eng Documents ID Priority	PM/Eng/ NetOps Docs Approved		
	Implementation Geo Regions/Sites	UC Implementation		
DISN Backbone	Conduct JITC Testing of Products	Acquire and Deploy Enterprise UC Infrastructure Selected Geographic Enclaves		
	ID Sites & Vendors' Products for Pilot	Enterprise UC Pilots Validates a Broad Range of Unified Capabilities		
NETOPS	NetOps Documentation : Sustainment Plan, CONOPS, & TTPS Updated	Joint DISA/MILDEP E2E Situational Awareness & Assured Operations		
	Leverage UC Spiral 1 & 2 NetOps			
DoD Component Edge	DoD Component Stand Up Support to Implementation With MP/IPs	Acquire and Deploy DoD Component Edge Infrastructure to Replace Legacy Infrastructure Phase out of TDM Voice Switches and Phase in Enterprise UC		

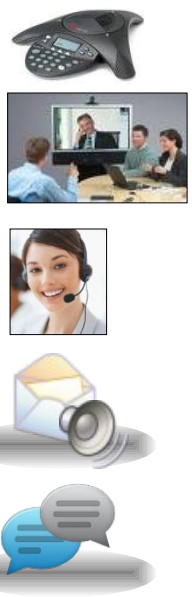
Today's Enterprise Services

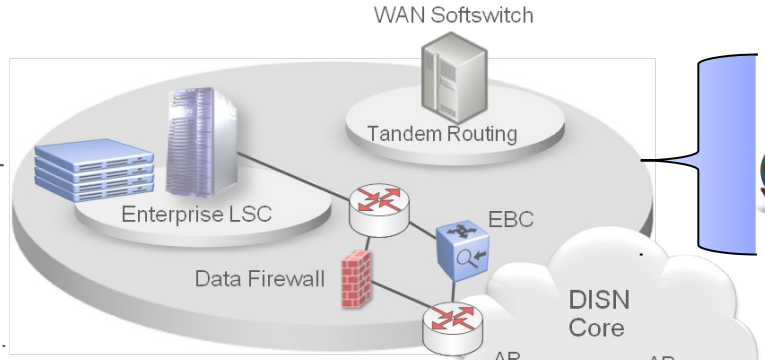
DISA A Combat Support Agency

Integrated VVoIP and Data Collaboration Services

Centralized Enterprise Services

- **Audio Conferencing**
- **Video Conferencing**
- **Attendant Services**
- **Voicemail**
- **IM, Chat, Presence**

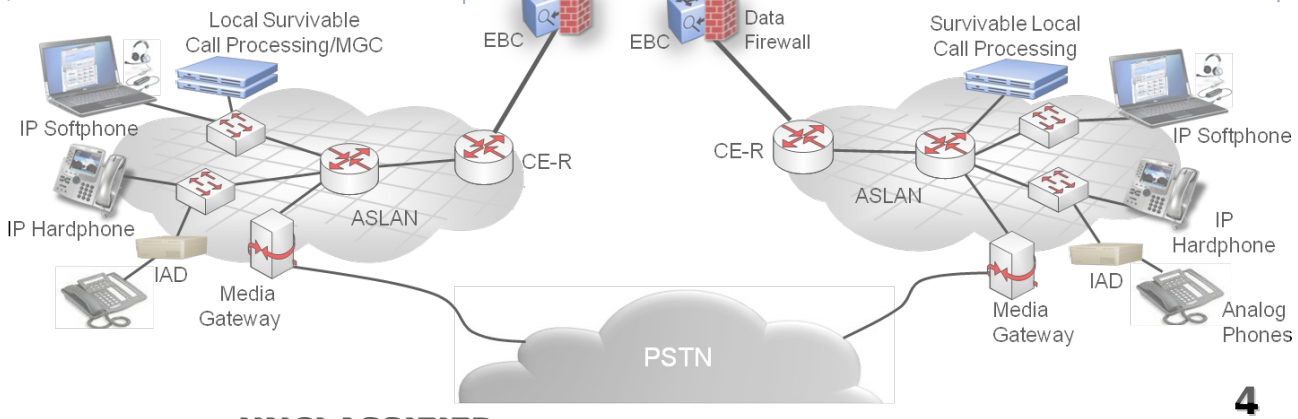




User / Service Mobility

Common End User Devices

- **Softphones on Laptops**
- **IP Hardphones**
- **Analog Phones via IADs**



UNCLASSIFIED

FY 2013 Enterprise Services

A Combat Support Agency

DISN Integrated UC, E-mail, Directory & DCO Service

Centralized Enterprise Services

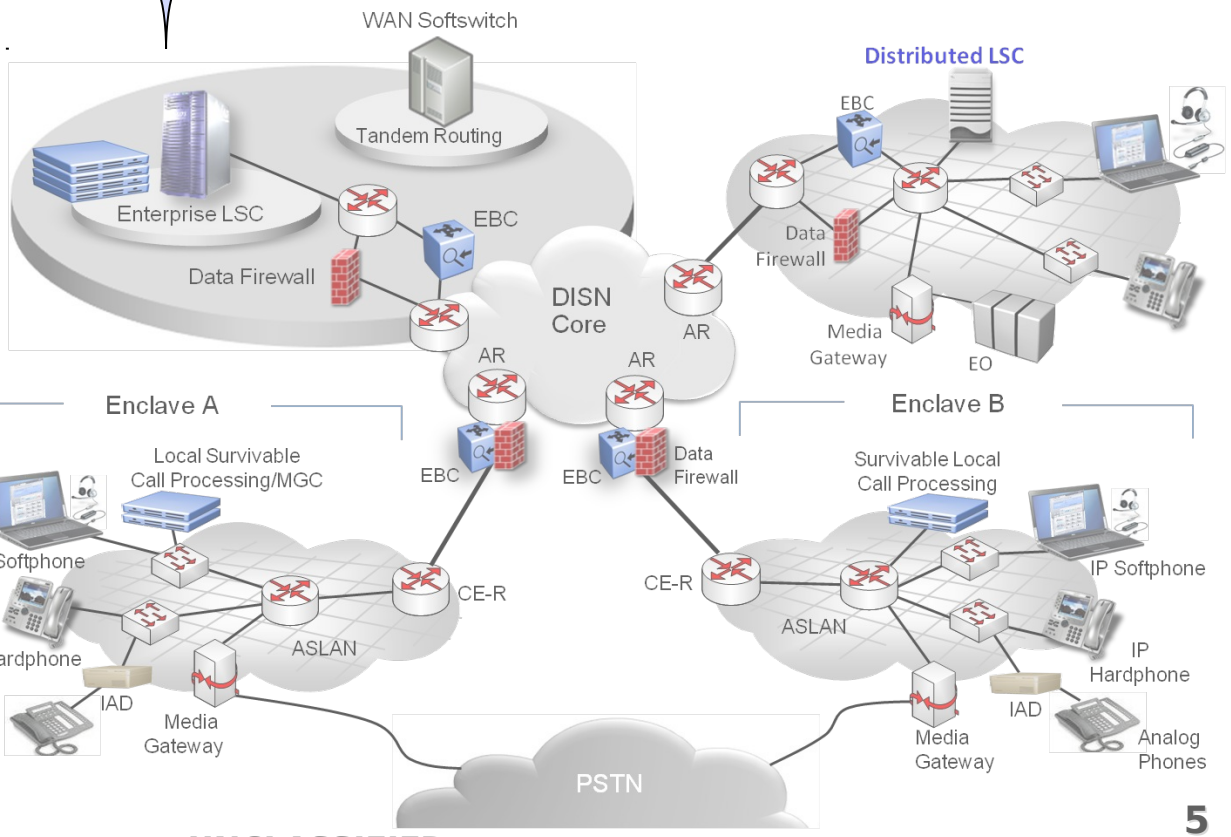
- **Audio Conferencing**
- **Video Conferencing**
- **Attendant Services**
- **Voicemail**
- **IM, Chat, Presence**

User / Service Mobility

Enterprise Directory Integration

DCO Integration with UC Conferencing

Enterprise E-Mail



Common End User Devices

- **Softphones on Laptops**
- **IP Hardphones**
- **Analog Phones via IADs**

UNCLASSIFIED

DISA
A Combat Support Agency

SBU Enterprise Voice Systems

Worldwide Multivendor Enterprise Solution

- **Distribution of 4M users**
  - **OCONUS (13 Major Regions with ~ 650K Users)**
    - **PAC 6 Major Regions : Korea, Japan, Okinawa, Guam, Hawaii, Alaska**
    - **Eur 4 Major Regions: UK, Germany/BeneLux/Spain, Italy, Turkey**
    - **CENTCOM 3 Major Regions : Iraq, Afghanistan, Other**
  - **CONUS 3.35M users with number of regions determined by Scalability of the UC Systems**
- **Larger Enterprises are desirable**
  - **Less hardware and software**
  - **Consolidated manpower**
  - **Larger quantities of licenses per site allows for bulk purchases**
- **Target Enterprise LSC Locations -- TBD**
  - **OCONUS driven by survivability and availability**
  - **CONUS driven by vendor scalability, number of users, and MILDEP preferences**

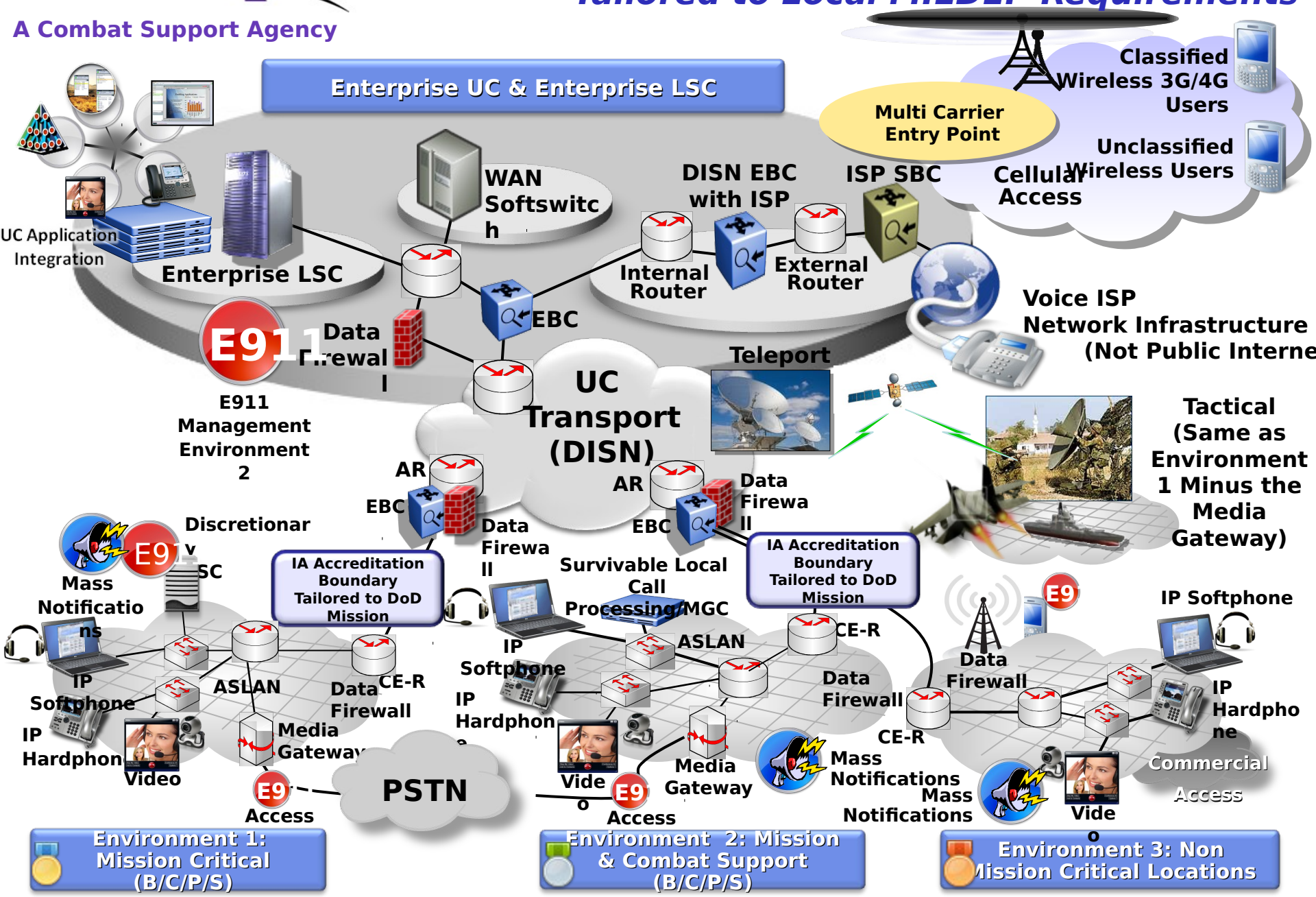
UNCLASSIFIED

Enterprise Voice Architecture

Tailored to Local MILDEP Requirements

DISA

A Combat Support Agency



Proposed DoD UC Service Offerings

A Combat Support Agency

Environments 1a and 1b Operational Base

1a. Requires, under normal operating conditions, access to all UC services described above and in the event it is disconnected from DISN, requires all-subscriber basic local UC services (local-user presence, voice, video, IM/chat) and limited external commercial services (available to all users on a precedence basis). An example of this environment would be an operational flying base.

1b. The same as 1a, but in a deployed location such as

Environment 2 Operational Base

2. A main operating base that requires, under normal operating conditions, access to all UC services described above and in the event it is disconnected from DISN, requires all-subscriber voice-only service and limited external commercial services (available to all users on a precedence basis). An example of this environment would be a non-flying base such as a training or logistics facility.

Environment 3 Non-Operational Site

3. A small-scale location that requires, under normal operating conditions, access to all UC service described above, but does not require any UC services, including voice services or external commercial services, in the event it is unable to connect to the DISN. An example of this would be a remote recruiting office, or remote administrative detachment.

UC Gold Service Offering

Provides remote subscriber management of users hosted off the base-LSC, VVoIP conferencing, E911 services, and external carrier access for cellular and PSTN services.

UC Silver Service Offering

Provides Session Control from the E-LSC, VVoIP conferencing services, E911 services, and external carrier access for cellular and PSTN services. In survivable mode, PSTN/E911 access is via a local Media Gateway (MG).

UC Bronze Service Offering

Provides Session Control from the E-LSC, VVoIP conferencing services, E911 services, and external carrier access for cellular and PSTN services. Location uses alternative communication (such as cellular) for survivability

Defense Information Systems Agency

A Combat Support Agency

Enterprise Service Voice Features

Edge Boundary Controller (EBC)

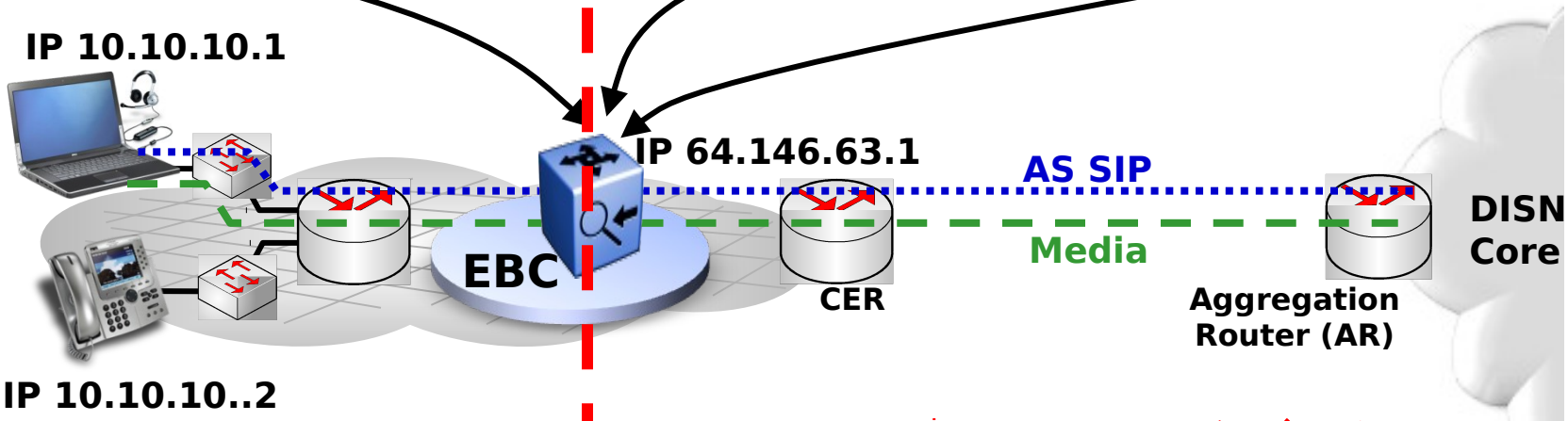
DISA
A Combat Support Agency

Layer 7 VVoIP AS-SIP Firewall

Performs NAPT Traversal / Topology Hiding for VVoIP*

Statefully Opens and Closes Pinholes for UDP Bearer Traffic Based on AS SIP Messaging

Intrusion Detection/ Prevention Services



IA Accreditation Boundary

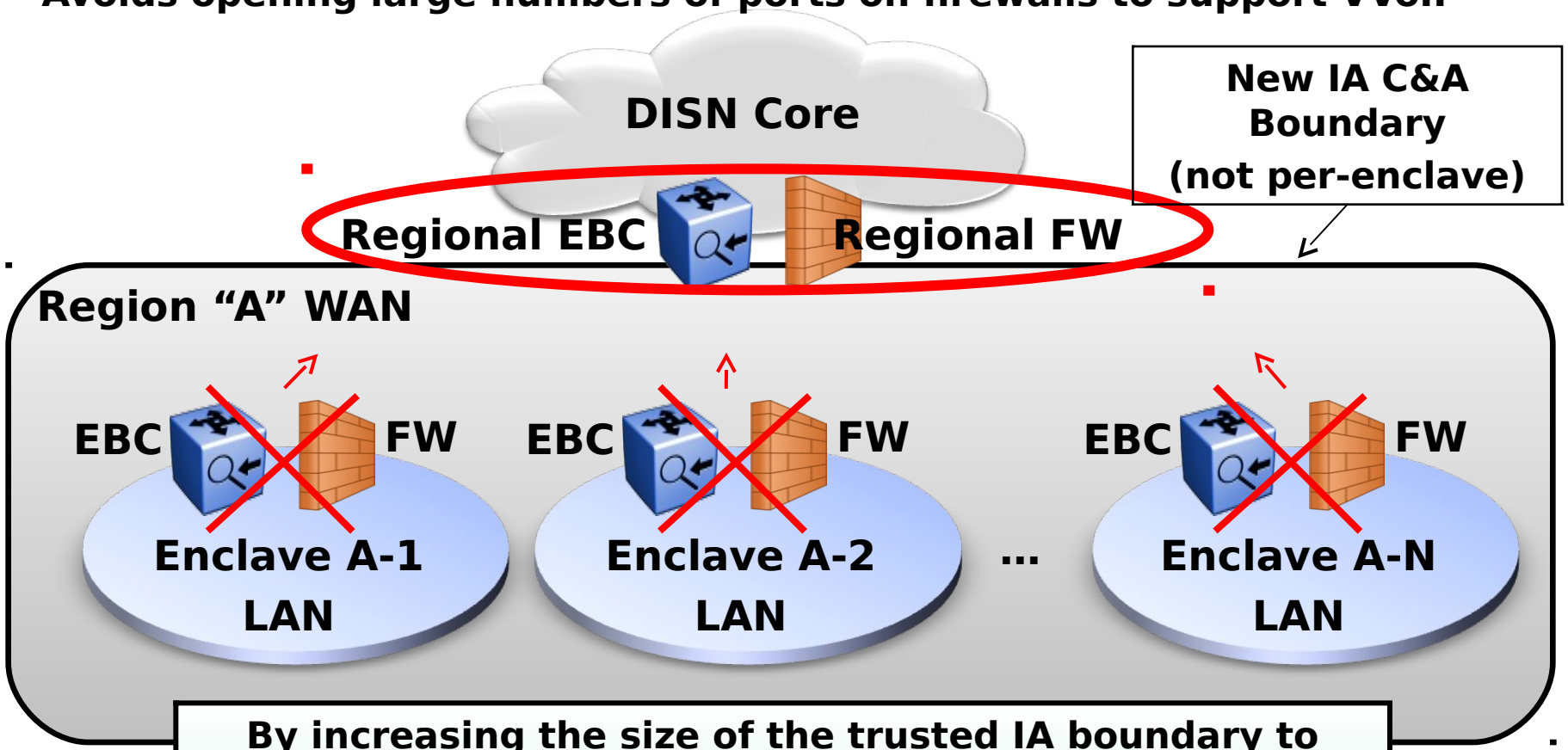
Based on Commercial Session Border Controller Technology

DISA
A Combat Support Agency

Consolidating IA Accreditation Boundaries

Minimizes Need for Data Firewalls, IDSs, and EBCs

- EBCs are deployed at each IA accreditation boundary in parallel with data firewalls
- Avoids opening large numbers of ports on firewalls to support VVoIP



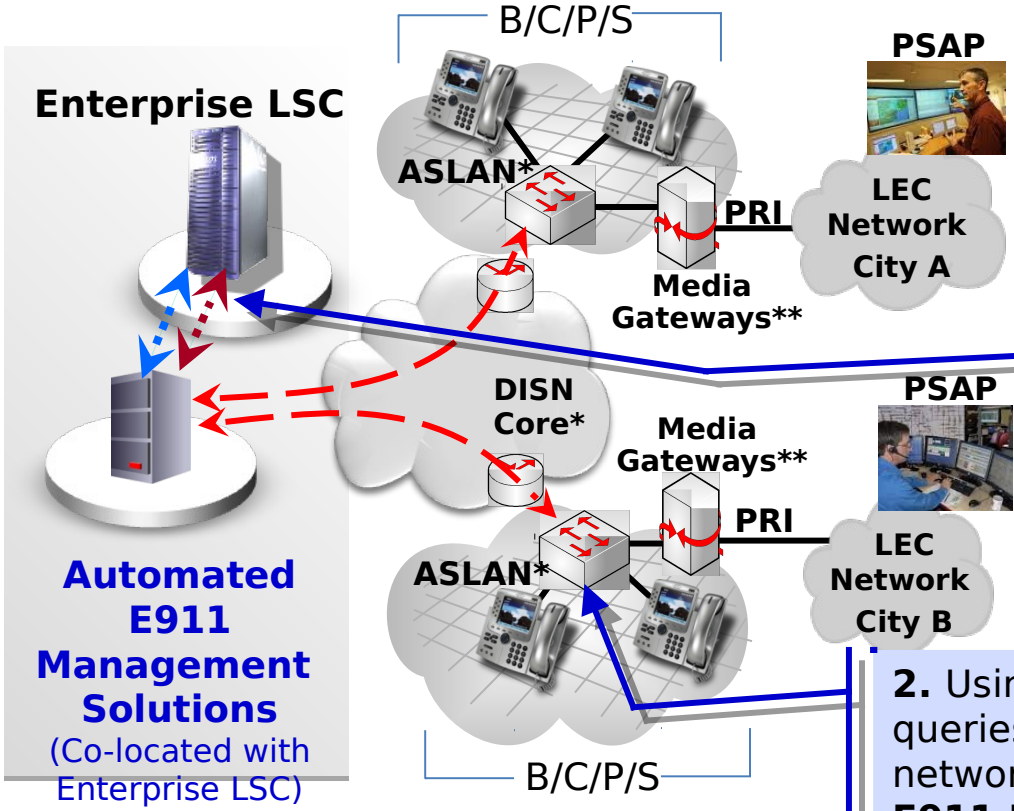
By increasing the size of the trusted IA boundary to cover larger regions, can reduce number of EBCs required

(Example: Air Force CITS Block 30 Network)

Automated E911 Management Solution

DISA
A Combat Support Agency

Automatically Updates E911 Information Without User Intervention



Using the Link Layer Discovery Protocol (LLDP) and SNMP, IP phones are tracked behind an Ethernet switch port:

- The MAC address of an IP phone is dynamically associated with a switch port.
- The switch port is associated with a particular Emergency Response Location (ERL).

1. To track the location of phones, the E911 Management Solution uses SNMP to query the LSC for a list of registered phones and their associated MAC address.

2. Using SNMP, the E911 Management Solution queries the layer 2 access switches in the network (**the ones specifically identified to E911 Management Solution**) to determine the port to which the phones are connected. The E911 Management Solution does this tracking at regular intervals during the day so that it can identify when a phone moves. **See "Backup Slides," for details regarding the processing of E911 calls.**

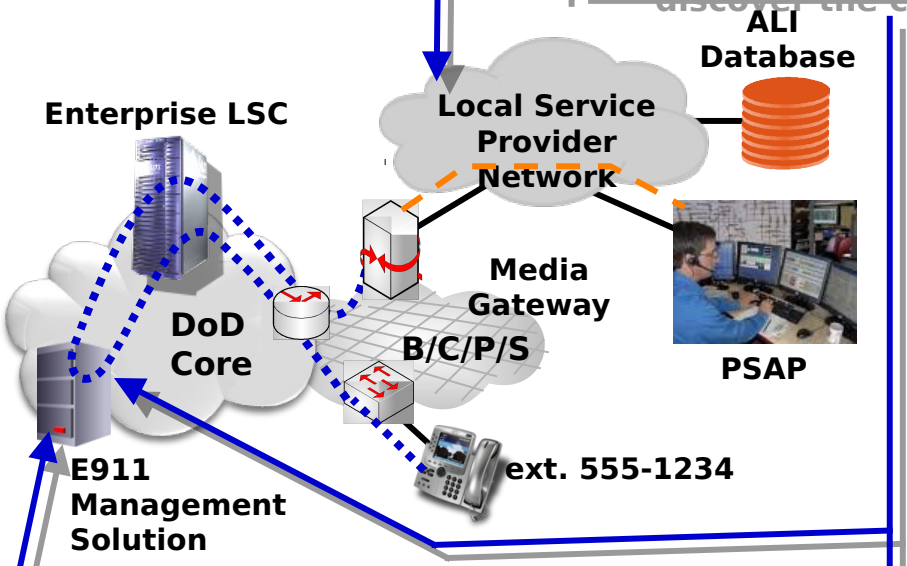
* For the sake of simplicity, the ASLAN and DISN Core network infrastructures are greatly simplified.
** For COOP and E911 calls, each enclave has a Media Gateway with PRI links to the service provider's network.

DISA

A Combat Support Agency

What Happens When a User Makes an Emergency Call

6. The service provider looks up the ELIN in the automatic location information (ALI) database, and routes the call to the appropriate PSAP.
7. The PSAP uses the ELIN as an index into the ALI database to discover the caller's address, etc.



When an emergency call is originated from ext. 555-1234:

1. The LSC routes the call over to the E911 Management Solution.
2. Using its internal mapping tables, the E911 Management Solution is able to associate ext. 555-1234 with a particular phone and is able to associate that phone with a particular MAC address.
3. Using information derived from the phone tracking process described on slide 8, the E911 Management Solution knows which switch port a phone is connected to and is able to associate that "switch port" location with a particular Emergency Response Location (ERL) within a

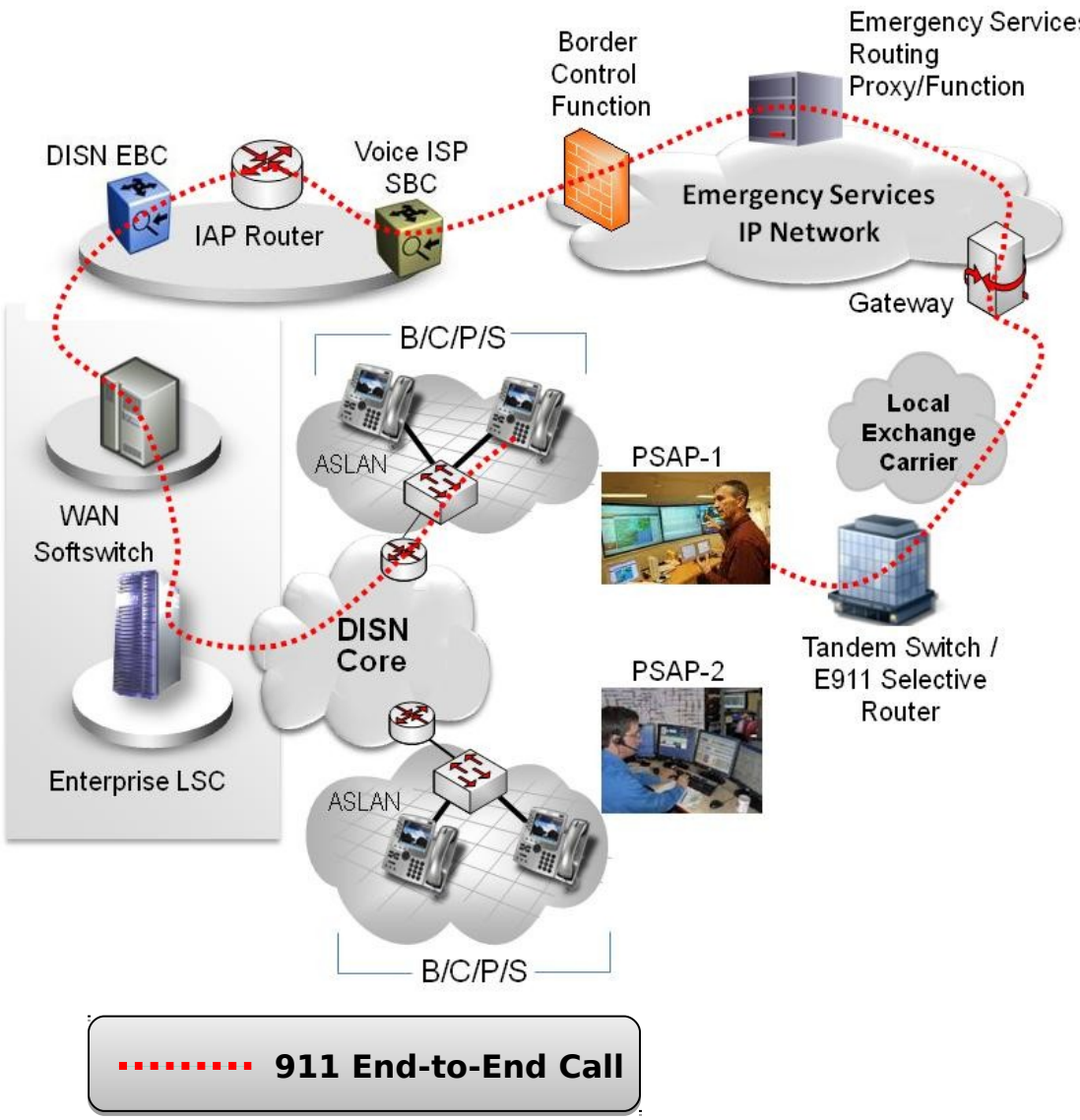
4. The internal mapping tables of the E911 Management Solution associates the Emergency Response Location (ERL) with the following:
   a. The gateway route to the appropriate service provider's network .
   b. The appropriate Emergency Location Identification Number (ELIN) which is used by the local Service Provider to route the call to the appropriate PSAP
5. The E911 Management Solution converts the calling party number to the ELIN. The E911 Management Solution via the LSC routes the call to the appropriate Gateway (per the route pattern associated with the ERL).

•Acknowledgement: Content derived from Cisco Emergency Responder Guide

911 Service Via the Voice ISP

DISA
A Combat Support Agency

Standards Based Solution a Work-in-Progress



- **In North America alone, there are over 6000 local Public Safety Access Points (PSAPs).**
- **A highly standardized system is essential to enable the seamless inter-communications between the Voice ISP and the geographically appropriate PSAP. While a great deal of progress has been made, Next Generation 911 (NG9-1-1) standards are still a work-in-progress.**
- **The NG9-1-1 infrastructure (e.g., Emergency Call Routing application servers and associated databases) is expected to take several years to implement.**
- **Standards to ensure the security of 911 related information both "at rest" and "in transit" are also a work-in-progress.**

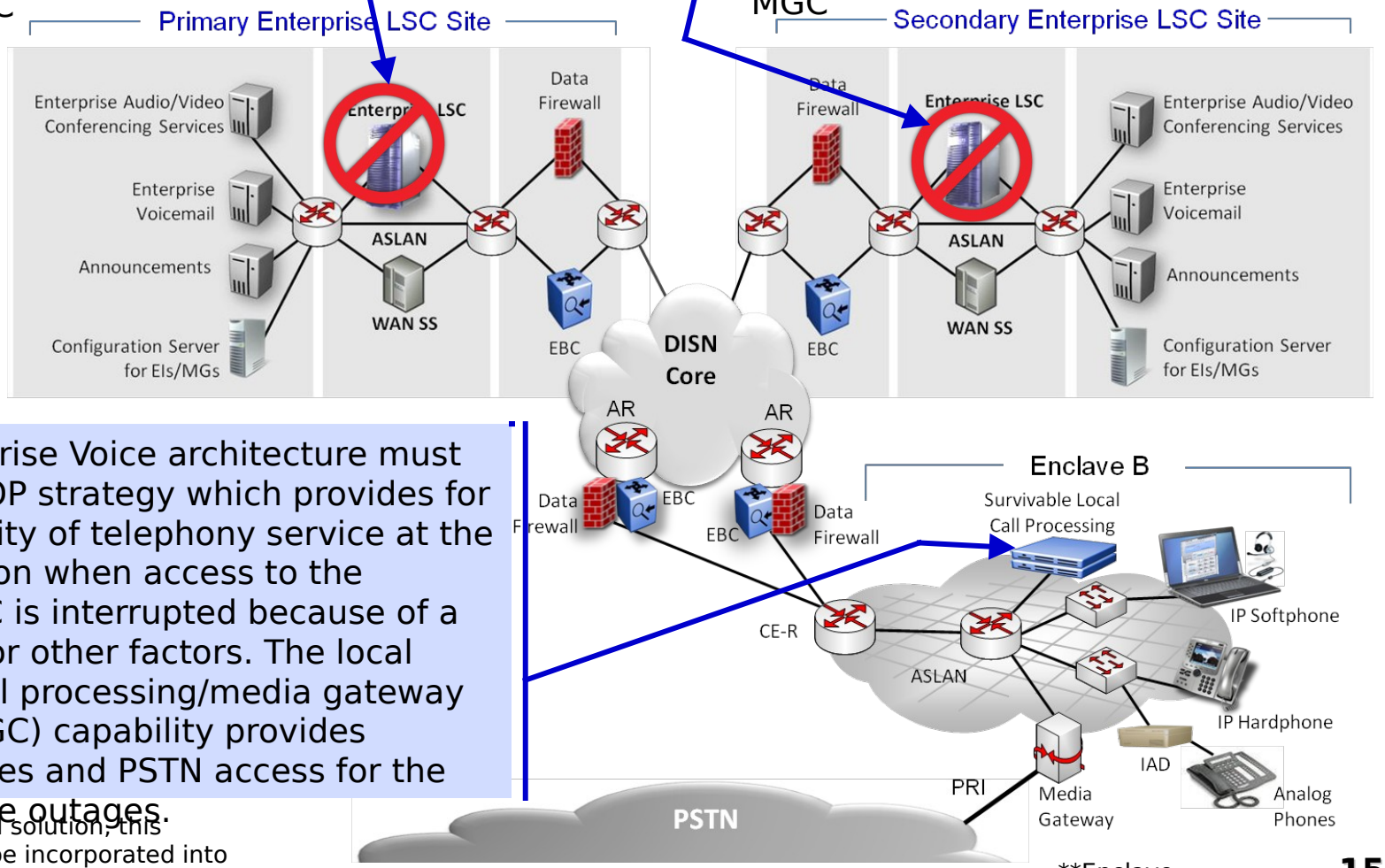
DISA

A Combat Support Agency

Continuity of Operations (COOP) *Capability*

1. If access to Primary Enterprise LSC is interrupted => Failover to Secondary Enterprise LSC

2. If access to Secondary Enterprise LSC is interrupted => Failover to Local Survivable Call Processing / MGC



3. The Enterprise Voice architecture must include a COOP strategy which provides for the survivability of telephony service at the B/C/P/S location when access to the EnterpriseLSC is interrupted because of a WAN outage or other factors. The local survivable call processing/media gateway controller (MGC) capability provides routine services and PSTN access for the duration of the outages.

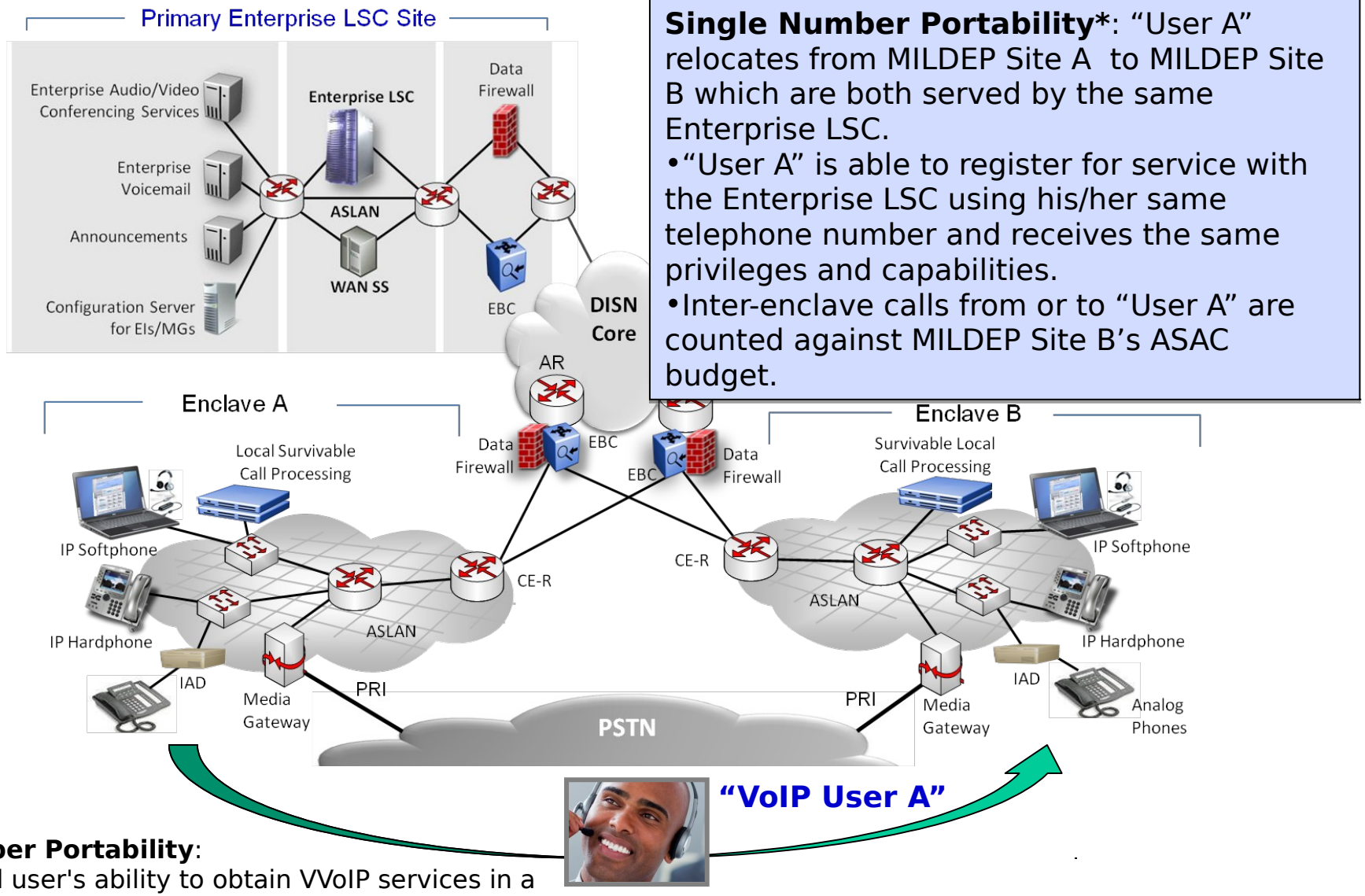
* In the operational solution, this functionality may be incorporated into Router or Media Gateway H/W.

**Enclave: B/C/P/S

Single Number Portability

A Combat Support Agency

Supports Subscriber Mobility Within a Region



Single Number Portability*: "User A" relocates from MILDEP Site A to MILDEP Site B which are both served by the same Enterprise LSC.

- "User A" is able to register for service with the Enterprise LSC using his/her same telephone number and receives the same privileges and capabilities.
- Inter-enclave calls from or to "User A" are counted against MILDEP Site B's ASAC budget.

*** Number Portability**:
The end user's ability to obtain VVoIP services in a transparent manner regardless of the end user's point of attachment across a given Enterprise Region

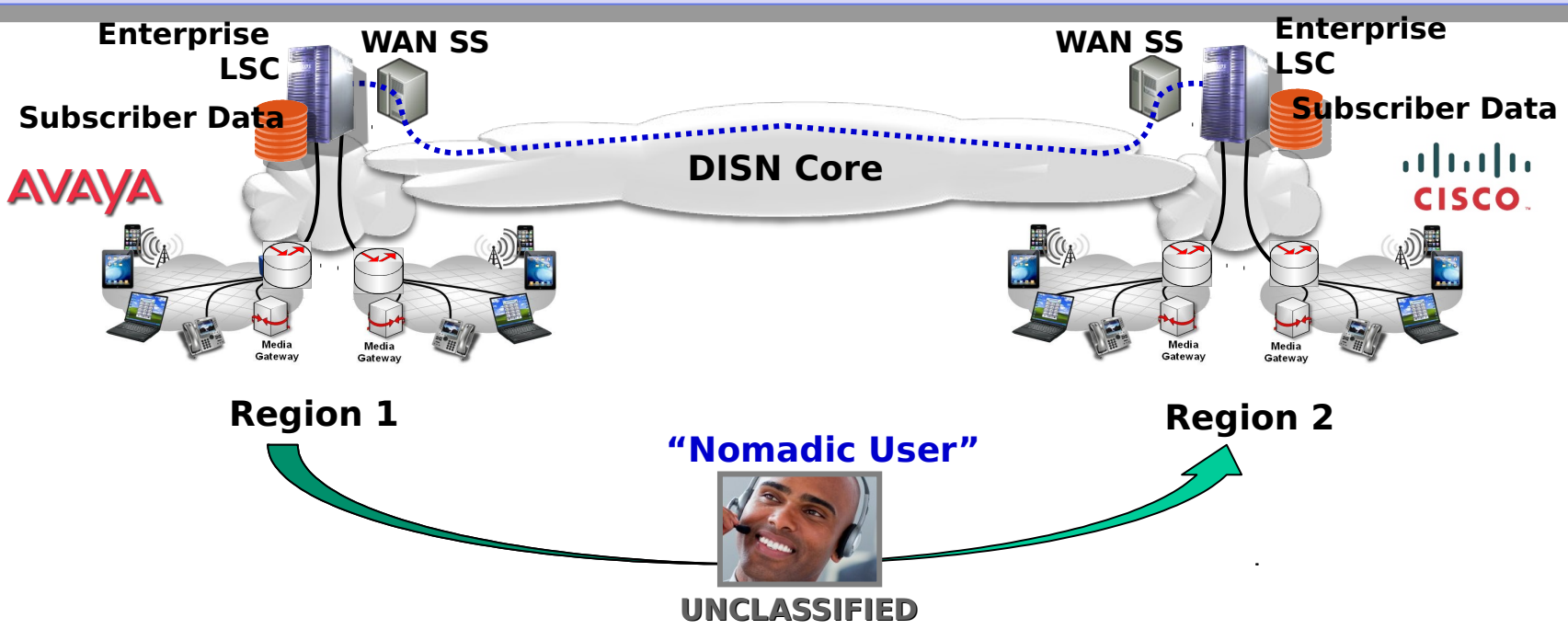
DISA

A Combat Support Agency

UC Mobility Between Regions

Vendor and Database Limitations

- System scalability, geographic location of the hosted users, and performance requirements necessitate the regionalized deployment of Enterprise LSCs (E-LSCs).
- E-LSCs intercommunicate via their co-located WAN Softswitch (WAN SS).
- To support transparent user mobility between Regions, E-LSCs would need to be able to freely exchange Subscriber Profile Data. Today, subscriber profile data is vendor specific. Therefore, the exchange of Subscriber Profile Data between E-LSCs is not currently a viable option.
- Vendor End Instruments use proprietary protocols to interface between LSC and End Instrument. End Instrument movement would be limited to regions with the same vendor E-LSC
- Near-term Alternative: Automate the process of populating specific user fields within a Subscriber's Profile using an add-on capability that permits the E-LSC to import user attribute values from an external Enterprise LDAP directory into its embedded, local database (See backup slides for additional details) and use AS SIP end instruments when migrating between regions.



Enterprise Classified Voice and Video (CVVoIP)

DISA
A Combat Support Agency

Enterprise CVVoIP Way Forward

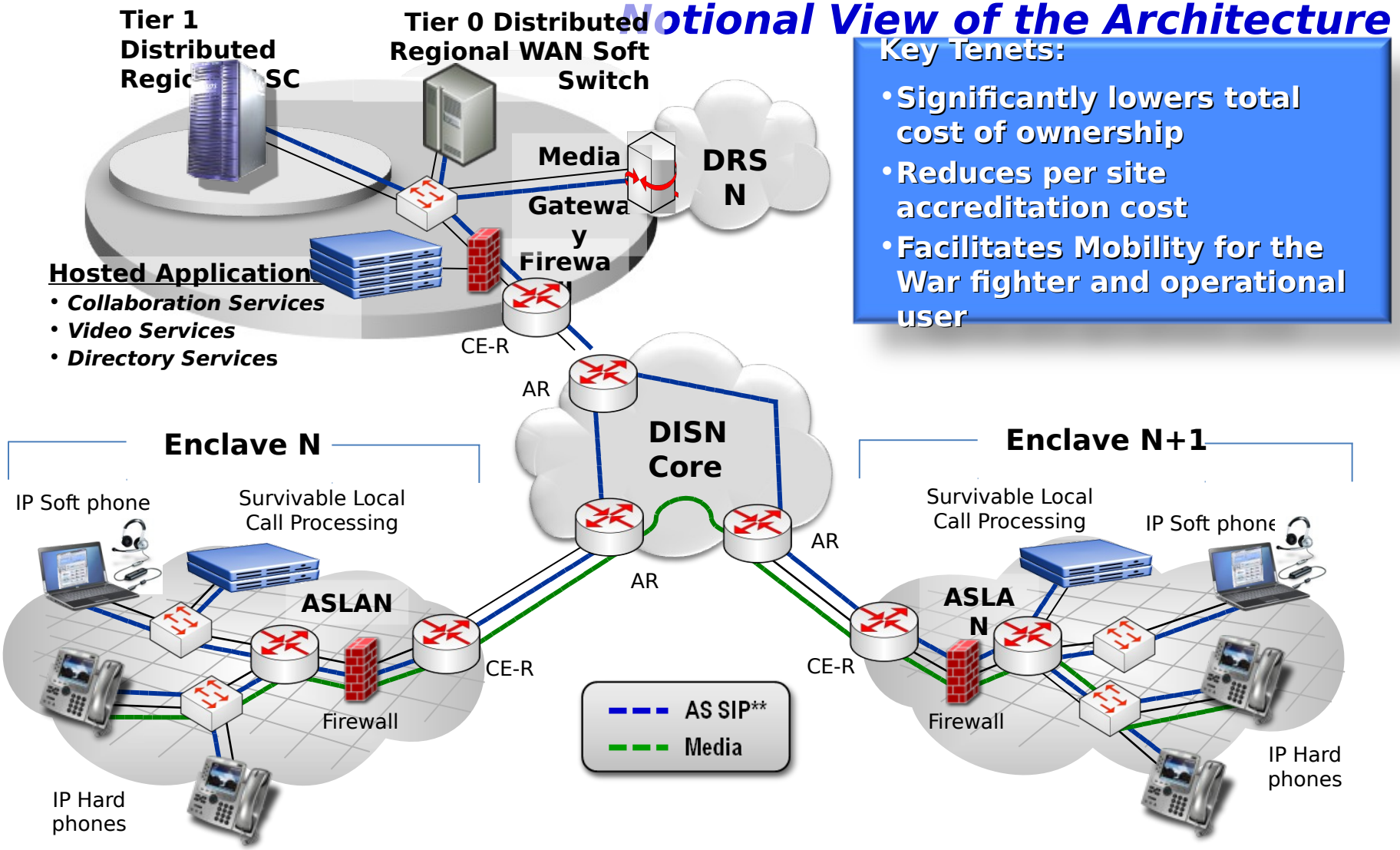
Journey Has Begun

- **Achieve approval for proposed Enterprise CVVoIP architecture**
- **Define resources needed**
  - **Site survey and cost – after CSD cost estimate**
  - **Develop BOM – Completed /Equipment on order**
  - **Implementation Plan - October**
- **Time-line for a phase approach and select locations/sites**
  - **Phase 1a (CONUS) – End of December 2011**
  - **Phase 1b (EUR) – End of December 2011**
  - **Phase 2 (SWA) - TBD**
  - **Phase 3 (PAC) - TBD**
- **Plan for NetOPS requirements**
  - **Accreditation**
  - **Define/develop the connection process and operations TTP's**
  - **Sustainment**
- **Support coordination with the MILDEP's**
  - **ARMY CIO very much interested in a DISA Enterprise CVVoIP soonest (preference for CONUS first)**

DISA
A Combat Support Agency

Enterprise CVVoIP Service

Notional View of the Architecture



Key Tenets:

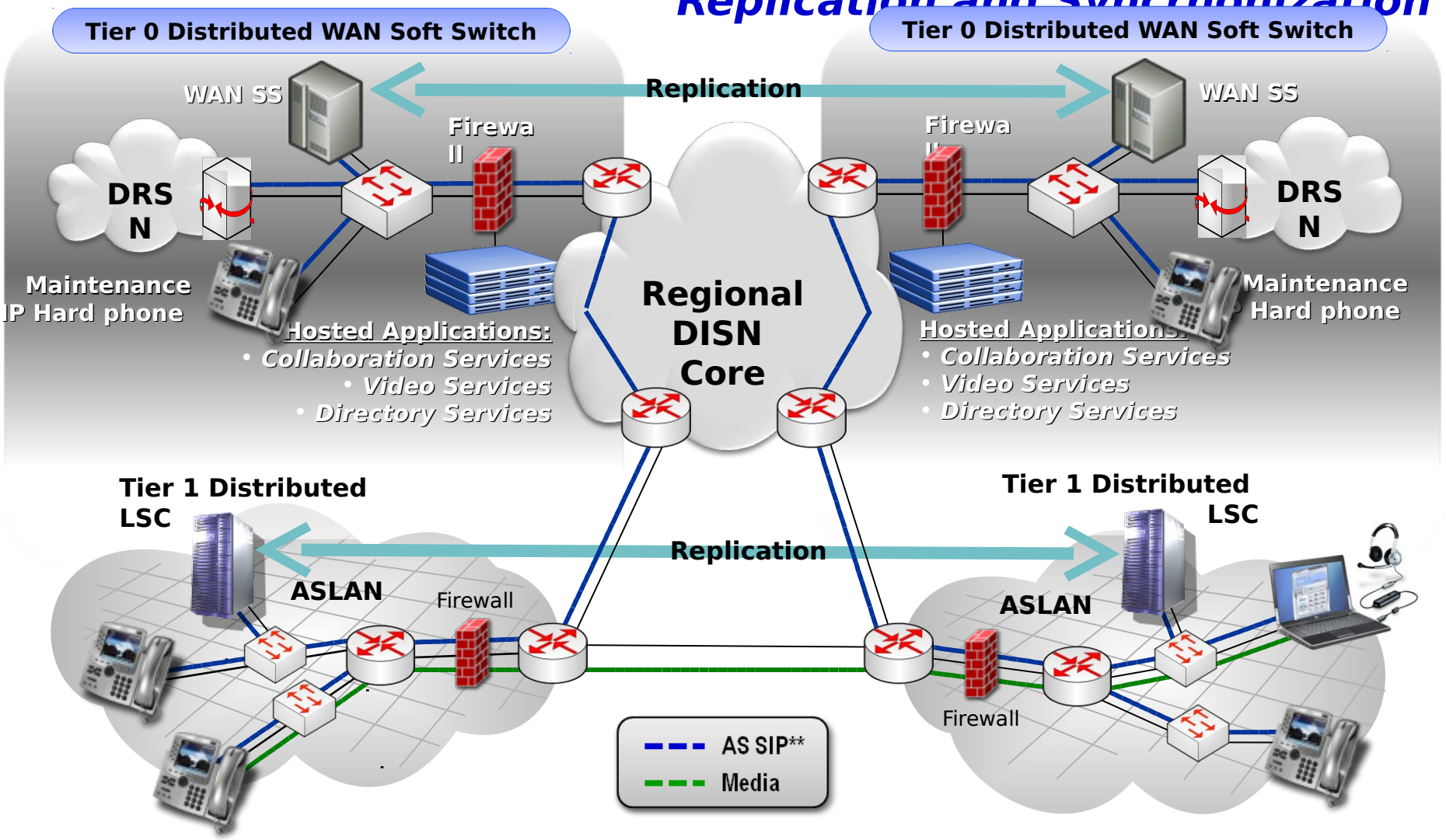
- **Significantly lowers total cost of ownership**
- **Reduces per site accreditation cost**
- **Facilitates Mobility for the War fighter and operational user**

**** Proprietary signaling from the EI to the LSC is also allowed.**

DISA
A Combat Support Agency

Regional CVVoIP Service

Replication and Synchronization



www.disa.mil

UNCLASSIFIED